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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Dou Yuanzhu et al.
Serial No. To Be Assigned
Filing Date: Herewith
For: Converter for Satellite Communication Reception Simplified in Structure

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to examination of the above-identified application, please amend the application as follows:

In the Specification

Please rewrite the paragraph on page 6, lines 1-17 as follows:

(Amended) As shown in Fig. 2 and Fig. 3, a circuit substrate 4 is fitted to the case 2, and a pair of probes 5 and 6 are coupled to the circuit substrate 4 by solder or other suitable joints.

A converter circuit (not shown) includes an amplifier, an oscillator and the like coupled to the circuit substrate 4. The first probe 5 is a straight pin member while the second probe 6 is preferably an L-shaped pin member; preferably, the tips of the probes 5 and 6 extend into two waveguides 2a and 2b positioned in the case 2. By integrating the waveguide 1 with the case 2 by fasteners or fixing means such as bolts, the first propagation path 1a and the first waveguide 2a can communicate with each other just as the second propagation path 1b and the second waveguide 2b can communication with each other. In this preferred configuration, the tip of the first

probe 5 extends in a direction parallel to the polarization plane of the horizontally polarized wave, and that of the second probe 6 extends in a direction parallel to the polarization plane of the vertically polarized wave.

Please rewrite the paragraph beginning on page 6, line 18 and ending on page 7, line 15 as follows:

(Amended) In the preferred converter for satellite communication, when orthogonal bipolarized signals transmitted from a satellite are received within the waveguide 1 through the horn 1c, the horizontally polarized wave is reflected by the short-circuit rod 3 toward the first propagation path 1a to the first waveguide 2a, and reflected by an innermost wall of the first waveguide 2a to be detected by the first probe 5. On the other hand, the vertically polarized wave passes the short-circuit rod 3 to proceed from the second propagation path 1b to the second waveguide 2b, and is reflected by an innermost wall of the second waveguide 2b to be detected by the second probe 6. The horizontally polarized signals detected by the first probe 5 and the vertically polarized signals detected by the second probe 6, after undergoing frequency conversion into IF signals by the converter circuit on the circuit substrate 4, are outputted via output terminals (not shown) provided on the case 2. Therefore, the orthogonal bipolarized waves, comprising the horizontally polarized wave and the vertically polarized wave, are coupled in the waveguides 2a and 2b of the case 2 to their respective probes 5 and 6. Preferably, the signals detected by probes 5 and 6 can be amplified and synthesized on the same circuit substrate 4, which significantly reduces signal losses and interference and simplifies the input structure of the waveguides.

Please rewrite the paragraph on page 7, lines 16-19 as follows:

(Amended) Fig. 4 shows a plan view of a preferred case provided in a second preferred embodiment; Fig. 5, a sectional view taken along line 5-5 in Fig. 4, and Fig. 6, a section along line 6-6 in Fig. 4.

Please rewrite the paragraph beginning on page 7, line 20 and ending on page 8, line 4 as follows:

(Amended) In a second preferred embodiment, the circuit substrate 4 is comprised of electroconductive patterns as first and second probes 7 and 8 are partially enclosed by short caps 9 and 10 comprising an electroconductive metallic

material. Preferably, the electroconductive metallic material provides reflective faces for the two probes 7 and 8 that are fitted to the circuit substrate 4 by soldering or other joints. Further, within the case 2, the two waveguides 2a and 2b are preferably bent or inclined at a right angle relative to the short caps 9 and 10, respectively, and the tip of the first probe 7 extends into a hollow area surrounded by the first waveguide 2a and the short cap 9, while that of the second the probe 8 extends into a second hollow area surrounded by the second waveguide 2b and the short cap 10.

Please rewrite the paragraph on page 8, lines 5-15 as follows:

(Amended) In the second embodiment of the invention, a horizontally polarized wave entered from the first propagation path 1a into the first waveguide 2a travels within the first waveguide 2a toward the circuit substrate 4 and is reflected by the short cap 9 toward the first probe 7 on the circuit substrate 4. Preferably, the horizontally polarized wave is detected by the first probe 7. On the other hand, a vertically polarized wave entering the second propagation path 1b into the second waveguide 2b travels within the second waveguide 2b toward the circuit substrate 4, and is reflected by the short cap 10 to the second probe 8 on the circuit substrate 4. Preferably, the vertically polarized wave is detected by the second probe 8.

Please rewrite the paragraph on page 8, lines 16-19 as follows:

(Amended) Fig. 7 shows a plan view of a case provided in a third preferred embodiment; Fig. 8 shows a sectional view taken along line 6-6 in Fig. 7, and Fig. 9 shows a sectional view taken along line 9-9 of Fig. 7.

Please rewrite the paragraph beginning on page 8, line 20 and ending on page 9, line 2 as follows:

(Amended) In the embodiment, the L-shaped pin members are supported by the circuit substrate 4 as first and second probes 11 and 12 and a ground pattern 13 provided on the surface of the circuit substrate 4 is used as the reflective face for the two probes 11 and 12. Thus, within the case 2, the two waveguides 2a and 2b are bent or inclined at a right angle relative to the circuit substrate 4, and the tip of the first probe 11 extends into the first waveguide 2a, while that of the second the probe 8 extends into the second waveguide 2b.

Please rewrite the paragraph on page 9, lines 3-13 as follows:

(Amended) In a third embodiment, a horizontally polarized wave entered from the first propagation path 1a into the first waveguide 2a travels within the first waveguide 2a toward the circuit substrate 4 and is reflected by the ground pattern 13 toward the first probe 11 in the first waveguide 2a. Preferably, the horizontally polarized wave is detected by the first probe 11. On the other hand, a vertically polarized wave entered from the second propagation path 1b into the second waveguide 2b travels within the second waveguide 2b toward the circuit substrate 4, and is reflected by the ground pattern 13 toward the second probe 12 in the second waveguide 2b. Preferably, the vertically polarized wave is detected by the second probe 12.

Please rewrite the paragraph on page 9, lines 14-25 as follows:

(Amended) Fig. 10 shows a sectional view of a case provided in a fourth preferred embodiment. In this embodiment,both waveguides 2a and 2b are substantially straight and the circuit substrate 4 is arranged in an orthogonal direction to the axial centers of the waveguides 2a and 2b. Thus, the tip of the first probe 11 having an L-shaped pin member extends into inside the first waveguide 2a, while that of the second probe 12 also having an L-shaped pin member extends into inside the second waveguide 2c. Preferably, the ground pattern 13 overlies a portion of the surface of the circuit substrate 4.

Please rewrite the paragraph beginning on page 9, line 26 and ending on page 10, line 9 as follows:

(Amended) In the fourth preferred embodiment, a horizontally polarized wave entered from the first propagation path 1a into the first waveguide 2a proceeds straight in the first waveguide 2a and is reflected by the ground pattern 13 overlying a portion of the surface of the circuit substrate 4 toward the first probe 11 of the first waveguide 2a. Preferably, the horizontally polarized wave is detected by the first probe 11. On the other hand, a vertically polarized wave entered from the second propagation path 1b to the second waveguide 2b proceeds straight in the second waveguide 2b and is also reflected by the ground pattern 13 toward the second probe 12 in the second waveguide 2b. Preferably, the vertically polarized wave is detected by the second probe 12.

Please rewrite the paragraph on page 10, lines 10-15 as follows:

(Amended) The present invention can be embodied in many other embodiments. For instance, in the fourth preferred embodiment shown in Fig. 10, the probes can be comprised of electroconductive patterns instead of pin members, or a short cap may be used instead of the ground pattern as the reflective face for the probes.

Please delete the paragraph on page 10, lines 16-17.

Please rewrite the paragraph beginning on page 10, line 18 and ending on page 11, line 1 as follows:

(Amended) The presently preferred embodiments comprise a case having two waveguides in which linear polarized waves orthogonal to each other propagate, a circuit substrate fitted to this case and two probes disposed on this circuit substrate. Preferably, the two probes are arranged in the waveguides. In operation, as the mutually orthogonal linear polarized waves are coupled to their respective probes in the two waveguides of the case and the signals are detected by these probes, the signals can be amplified and synthesized on the same circuit substrate. Accordingly, signal losses and interference be reduced and the input structure of the waveguides can be simplified.

In the Claims

Please rewrite Claim 1 as follows:

1 (Amended) A converter for satellite communication reception,comprising a case having two waveguides configured to receive linear polarized waves orthogonal to each other propagate, a circuit substrate fitted to the case, and two probes disposed on the circuit substrate, wherein the two probes are positioned within the waveguides.

Please rewrite Claim 2 as follows:

2. (Amended) The converter for satellite communication reception according to Claim 1, wherein the two probes comprise pin members supported by the circuit substrate.

Please rewrite Claim 3 as follows:

3. (Amended) The converter for satellite communication reception according to Claim 2, wherein the two pin members have an L shape, and wherein a

ground pattern overlying the circuit substrate is configured as a reflective face for the pin members.

Please rewrite Claim 4 as follows:

4. (Amended) The converter for satellite communication reception according to Claim 1, wherein the two probes comprise electroconductive patterns overlying the circuit substrate, and wherein short caps are coupled to the circuit substrate as reflective faces for the electroconductive patterns.

Please rewrite Claim 5 as follows:

5. (Amended) The converter for satellite communication reception according to Claim 1, wherein the two probes are substantially orthogonal to each other.

In the Abstract of the Disclosure

Please rewrite the Abstract of the Disclosure as shown on the following page.

REMARKS

Applicants have rewritten portions of the specification, Claims 1-5 and the Abstract of the Disclosure. The changes from the previous version to the rewritten version are shown in attached Appendix A, with strikethrough for deleted matter and underlines for added matter.

Respectfully submitted,

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(Amended) ABSTRACT OF THE DISCLOSURE

A converter for satellite communication reception which reduces signal losses and has a simplified assembling work is disclosed. In operation, orthogonal bipolarized signals transmitted from a satellite are branched into two propagation paths within a waveguide. A horizontally polarized wave is caused to proceed in a first propagation path, while a vertically polarized wave is caused to proceed in a second propagation path. A pair of probes supported by a circuit substrate and fitted to a case have tips that extend into two waveguides to receive the respective signals. By integrating the waveguide and the case by fastening, the first propagation path and the first waveguide are positioned to communicate with each other, as are the second propagation path and the second waveguide.

APPENDIX A
Attorney Docket No. 9281-4226
Converter for Satellite Communication Reception Simplified in Structure
Dou Yuanzhu et al.

In the Specification

Please amend the paragraph on page 6, lines 1-17 as follows:

(Amended) As shown in Fig. 2 and Fig. 3, a circuit substrate 4 is fitted to the case 2, and a pair of probes 5 and 6 are ~~supported by this~~coupled to the circuit substrate 4 by solder~~ing~~ or other~~wise~~ suitable joints.

A converter circuit (not shown) ~~including~~includes an amplifier, an oscillator and the like ~~is mounted on~~coupled to the circuit substrate 4. The first probe 5 is a straight pin member while the second probe 6 is preferably an L-shaped pin member~~, and~~; preferably, the tips of the probes 5 and 6 extend into two waveguides 2a and 2b ~~provided~~positioned in the case 2. By integrating the waveguide 1 ~~and~~with the case 2 by fasteners or fixing means such as bolts, the first propagation path 1a and the first waveguide 2a ~~are let to~~can communicate with each other~~, and so are~~ just as the second propagation path 1b and the second waveguide 2b can communication with each other. In this ~~establishment of communication~~preferred configuration, the tip of the first probe 5 extends in a direction parallel to the polarization plane of the horizontally polarized wave, and that of the second probe 6 extends in a direction parallel to the polarization plane of the vertically polarized wave.

Please amend the paragraph beginning on page 6, line 18 and ending on page 7, line 15 as follows:

(Amended) In the preferred converter for satellite communication ~~reception configured as described above~~, when orthogonal bipolarized signals transmitted from a satellite are ~~entered to inside~~received within the waveguide 1 through the horn 1c, the horizontally polarized wave is reflected by the short-circuit rod 3 ~~to proceed from~~toward the first propagation path 1a to the first waveguide 2a, and reflected by ~~the~~an innermost wall of the first waveguide 2a to be detected by the first probe 5. On the other hand, the vertically polarized wave passes the short-circuit rod 3 to proceed from the second propagation path 1b to the second waveguide 2b, and is reflected by ~~the~~an innermost wall of the second waveguide 2b to be detected by the

second probe 6. The horizontally polarized signals detected by the first probe 5 and the vertically polarized signals detected by the second probe 6, after undergoing frequency conversion into IF signals by the converter circuit on the circuit substrate 4, are outputted via output terminals (not shown) provided on the case 2. Therefore, the orthogonal bipolarized waves, comprising the horizontally polarized wave and the vertically polarized wave, are coupled in the waveguides 2a and 2b of the case 2 to their respective probes 5 and 6~~, and~~. Preferably, the signals detected by ~~these~~ probes 5 and 6 can be amplified and synthesized on the same circuit substrate 4, ~~making it possible to~~which significantly reduces signal losses and interference and ~~moreover to simplify~~simplifies the input structure of the ~~input parts of the~~ waveguides.

Please amend the paragraph on page 7, lines 16-19 as follows:

(Amended) Fig. 4 shows a plan view of ~~the essential part of~~ a preferred case provided in a second preferred embodiment~~ of the invention~~; Fig. 5, a sectional view taken along line 5-5 in Fig. 4, and Fig. 6, a section along line 6-6 in Fig. 4.

Please amend the paragraph beginning on page 7, line 20 and ending on page 8, line 4 as follows:

(Amended) In ~~this~~a second preferred embodiment~~ of the invention~~, the circuit substrate 4 is ~~provided with~~comprised of electroconductive patterns as first and second probes 7 and 8~~, and~~ are partially enclosed by short caps 9 and 10 ~~consisting of~~comprising an electroconductive metallic material~~ as~~. Preferably, the electroconductive metallic material provides reflective faces for the two probes 7 and 8 that are fitted to the circuit substrate 4 by soldering or other~~wise~~ joints. Further, within the case 2, the two waveguides 2a and 2b are preferably bent or inclined at a right angle ~~toward~~relative to the short caps 9 and 10, respectively, and the tip of the first probe 7 extends into a hollow area surrounded by the first waveguide 2a and the short cap 9, while that of the second the probe 8 extends into a second hollow area surrounded by the second waveguide 2b and the short cap 10.

Please amend the paragraph on page 8, lines 5-15 as follows:

(Amended) In the second embodiment of the invention~~ configured in this mode~~, a horizontally polarized wave entered from the first propagation path 1a into the first waveguide 2a ~~proceeds in~~travels within the first waveguide 2a toward the

circuit substrate 4 and is reflected by the short cap 9 ~~to be detected by~~toward the first probe 7 on the circuit substrate 4. Preferably, the horizontally polarized wave is detected by the first probe 7. On the other hand, a vertically polarized wave ~~entered from~~entering the second propagation path 1b into the second waveguide 2b ~~proceeds in~~travels within the second waveguide 2b toward the circuit substrate 4, and is reflected by the short cap 10 to ~~be detected by~~ the second probe 8 on the circuit substrate 4. Preferably, the vertically polarized wave is detected by the second probe 8.

Please amend the paragraph on page 8, lines 16-19 as follows:

(Amended) Fig. 7 shows a plan ~~of the essential part~~view of a case provided in a third preferred embodiment ~~of the invention~~; Fig. 8~~,~~ shows a sectional view taken along line 6-6 in Fig. 7, and Fig. 9~~,~~ shows a sectional view taken along line 9-9 ~~in~~of Fig. 7.

Please amend the paragraph beginning on page 8, line 20 and ending on page 9, line 2 as follows:

(Amended) ~~This~~In the embodiment, the ~~differs from the second embodiment described above in that~~ L-shaped pin members are supported by the circuit substrate 4 as first and second probes 11 and 12 and ~~that~~ a ground pattern 13 provided on the surface of the circuit substrate 4 is used as the reflective face for the two probes 11 and 12. Thus, within the case 2, the two waveguides 2a and 2b are bent or inclined at a right angle ~~toward~~relative to the circuit substrate 4, and the tip of the first probe 11 extends into the first waveguide 2a, while that of the second the probe 8 extends into the second waveguide 2b.

Please amend the paragraph on page 9, lines 3-13 as follows:

(Amended) In ~~the~~a third embodiment ~~of the invention configured as described above~~, a horizontally polarized wave entered from the first propagation path 1a into the first waveguide 2a ~~proceeds in~~travels within the first waveguide 2a toward the circuit substrate 4 and is reflected by the ground pattern 13 ~~to be detected by~~toward the first probe 11 in the first waveguide 2a. Preferably, the horizontally polarized wave is detected by the first probe 11. On the other hand, a vertically polarized wave entered from the second propagation path 1b into the second waveguide 2b ~~proceeds in~~travels within the second waveguide 2b toward the circuit substrate 4,

and is reflected by the ground pattern 13 ~~to be detected by~~toward the second probe 12 in the second waveguide 2b. Preferably, the vertically polarized wave is detected by the second probe 12.

Please amend the paragraph on page 9, lines 14-25 as follows:

(Amended) Fig. 10 shows a sectional view of ~~the essential part of~~ a case provided in a fourth preferred embodiment ~~of the invention~~. ~~This~~In this embodiment, ~~differs from the third embodiment described above in that~~ both waveguides 2a and 2b are substantially straight and ~~that~~ the circuit substrate 4 is arranged in an orthogonal direction to the axial centers of the waveguides 2a and 2b. Thus, the tip of the first probe 11 ~~consisting of~~having an L-shaped pin member extends into inside the first waveguide 2a, while that of the second probe 12 also ~~consisting of~~having an L-shaped pin member extends into inside the second waveguide ~~2b,~~2c. ~~and~~Preferably, the ground pattern 13 ~~is provided on~~overlies a portion of the surface of the circuit substrate 4.

Please amend the paragraph beginning on page 9, line 26 and ending on page 10, line 9 as follows:

(Amended) In the fourth preferred embodiment ~~of the invention configured as described above~~, a horizontally polarized wave entered from the first propagation path 1a into the first waveguide 2a proceeds straight in the first waveguide 2a and is reflected by the ground pattern 13 ~~on~~overlying a portion of the surface of the circuit substrate 4 ~~to be detected by~~toward the first probe 11 of the first waveguide 2a. Preferably, the horizontally polarized wave is detected by the first probe 11. On the other hand, a vertically polarized wave entered from the second propagation path 1b to the second waveguide 2b proceeds straight in the second waveguide 2b and is also reflected by the ground pattern 13 ~~to be detected by~~toward the second probe 12 in the second waveguide 2b. Preferably, the vertically polarized wave is detected by the second probe 12.

Please amend the paragraph on page 10, lines 10-15 as follows:

(Amended) The present invention can be embodied in ~~numerous~~many other ~~variations than the~~ embodiments ~~described above~~. For instance, in the fourth preferred embodiment shown in Fig. 10, the probes can be ~~composed~~comprised of

electroconductive patterns instead of pin members, or a short cap may be used instead of the ground pattern as the reflective face for the probes.

Please amend the paragraph on page 10, lines 16-17 as follows:

(Amended) ~~The present invention, carried out in the modes described above, provides the following benefits.~~

Please amend the paragraph beginning on page 10, line 18 and ending on page 11, line 1 as follows:

(Amended) The presently preferred embodiments comprise a~~A~~ case having two waveguides in which linear polarized waves orthogonal to each other propagate, a circuit substrate fitted to this case and two probes disposed on this circuit substrate, ~~are provided, and these~~ Preferably, the two probes are arranged in the waveguides. In operation, as~~As~~ the mutually orthogonal linear polarized waves are coupled to their respective probes in the two waveguides of the case and the signals are detected by these probes, the signals can be amplified and synthesized on the same circuit substrate~~, not only can~~. Accordingly, signal losses and interference be reduced ~~but also~~and the input structure of ~~the input parts of~~ the waveguides can be simplified.

In the Claims

Please amend Claim 1 as follows:

1 (Amended) A converter for satellite communication reception, ~~provided with~~comprising a case having two waveguides ~~in which~~configured to receive linear polarized waves orthogonal to each other propagate, a circuit substrate fitted to ~~this~~the case, and two probes disposed on ~~this~~the circuit substrate, wherein ~~these~~the two probes are ~~arranged in~~positioned within the waveguides.

Please amend Claim 2 as follows:

2. (Amended) The converter for satellite communication reception according to Claim 1, wherein the two probes ~~consist of~~comprise pin members~~, and wherein these pin members are~~ supported by the circuit substrate.

Please amend Claim 3 as follows:

3. (Amended) The converter for satellite communication reception according to Claim 2, wherein the two pin members ~~are formed in~~have an L shape, and wherein a ground pattern ~~provided on~~overlying the circuit substrate is ~~used~~configured as a reflective face for the pin members.

Please amend Claim 4 as follows:

4. (Amended) The converter for satellite communication reception according to Claim 1, wherein the two probes ~~consist of~~comprise electroconductive patterns ~~provided on~~overlying the circuit substrate, and wherein short caps are ~~fitted~~coupled to the circuit substrate as reflective faces for ~~these~~the electroconductive patterns.

Please amend Claim 5 as follows:

5. (Amended) The converter for satellite communication reception according to Claim 1, wherein the ~~directions of the~~ two probes are substantially orthogonal to each other.

In the Abstract of the Disclosure

Please amend the Abstract of the Disclosure as follows:

(Amended) ABSTRACT OF THE DISCLOSURE

A ~~simply structured~~ converter for satellite communication reception which ~~can contribute to reducing~~reduces signal losses and ~~to simplifying the~~has a simplified assembling work is ~~to be provided~~disclosed. In operation, ~~O~~orthogonal bipolarized signals transmitted from a satellite are branched into two propagation paths within a waveguide.~~, and a~~ A horizontally polarized wave is caused to proceed in a first propagation path, while a vertically polarized wave is caused to proceed in a second propagation path. A pair of probes ~~are~~ supported by a circuit substrate and fitted to a case~~, and~~ have tips ~~of the probes~~that extend into two waveguides ~~provided in the case~~to receive the respective signals. By integrating the waveguide and the case by ~~fixing means such as bolts~~fastening, the first propagation path and the first waveguide are ~~let~~positioned to communicate with each other, ~~and so~~as are the second propagation path and the second waveguide.